WHAT IS CLAIMED IS:

1.   A method for an invoking device to estimate contacted device availability in a pervasive peer-to-peer environment, comprising:

observing a number of attempts by the invoking device to contact the contacted

5   device and recording availability of the contacted device for each attempt as an availability indication for a time associated with the attempt;

extrapolating at least one availability indication to at least one on period;

computing a probability curve based on the extrapolated on period; and

estimating whether the contacted device has availability using the probability

10   curve.

2.   The method of claim 1, wherein the estimating whether the contacted device has availability is based on a time elapsed since a latest availability indication has been received.

3.   The method of claim 1, wherein computing the probability curve is based

15   on all on periods, all off periods, and all dormant periods.

4.   The method of claim 3, wherein extrapolating the at least one availability indication comprises extrapolating availability indications to at least one on period, at least one off period, and at least one dormant period.

5.   The method of claim 1, wherein extrapolating at least one availability

20   indication comprises:

considering the contacted device to be available from a time after an indication that the contacted device is available until a subsequent availability indication; and

considering the contacted device to be unavailable from a time after an indication that the contacted device is unavailable until a subsequent availability indication.

6.   The method of claim 5, wherein computing the probability curve comprises assessing on time relative to off time, and establishing the probability curve based on the on time and a total observe time.

7.   A method for an invoking device to estimate contacted device availability in a pervasive peer-to-peer environment, comprising:

observing a number of attempts by the invoking device to contact the contacted device and recording availability of the contacted device for each attempt as an availability indication for a time associated with the attempt;

establishing a number of time bins, each time bin representing a range of time quantities between attempts by the invoking device to contact the contacted device;

setting a number of availability indications into each time bin based on separation in time between attempts and whether the contacted device was available or unavailable; and

establishing contacted device availability by correlating time since a last availability was received with an appropriate time bin and a ratio between available and unavailable indications within the appropriate time bin.

8.   The method of claim 7, wherein setting the number of availability indications comprises:

establishing a quantity of positive indications corresponding to an availability indication for the time bin being available, and

establishing a quantity of negative indications corresponding to an availability indication for the time bin being unavailable.

9.   The method of claim 7, wherein establishing the number of time bins comprises establishing two sets of time bins, one set of time bins corresponding to an initial available indication, and the other set of time bins corresponding to an initial unavailable indication.

5   10.   The method of claim 7, wherein said establishing contacted device availability comprises computing a probability curve based on time bins and ratios associated with each time bin.

11.   The method of claim 10, wherein said probability curve is smoothed using linear interpolation.

10   12.   The method of claim 10, wherein said probability curve is smoothed using polynomial interpolation.

13.   The method of claim 7, wherein time bins have varying time spacing.

14.   A device for estimating contacted device availability in a pervasive peer-to-peer environment, comprising:

15   a transmitter configured to transmit a request for availability from the contacted device;

a receiver receiving an availability indication for the contacted device;

a storage mechanism for storing each time and each availability indication from the receiver, wherein a plurality of availability indications and associated times form an

20   availability history;

a processor for querying the storage mechanism for the availability history;

a computing module capable of computing an availability probability curve based on the availability history; and

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an availability determination module able to apply the current time to the availability probability curve to assess the availability of the contacted device.

15.   The system of claim 14, further comprising an optional decision module configured to determine whether one contacted device is more likely available than other contacted devices.

16.   The system of claim 15, wherein the storage mechanism stores contacted device availability for a plurality of contacted devices, and wherein the optional decision module is configured to seek contacted device availability for a plurality of contacted devices from the storage mechanism.

17.   The system of claim 14, wherein the availability determination module determines whether the contacted device has availability is based on a time elapsed since a latest availability indication has been received.

18.   The system of claim 14, wherein the computing module extrapolates all availability indications to at least one on period and at least one off period, and wherein the computing module computes the availability probability curve based on relative values for all on periods and all off periods.

19.   The system of claim 18, wherein computing module further extrapolates availability indications to at least one dormant period, and the computing module computes the availability probability curve based on all dormant periods.

20.   The system of claim 18, wherein the computing module extrapolates all availability indications by considering the contacted device to be available from a time after an indication that the contacted device is available until a subsequent availability indication, and considering the contacted device to be unavailable from a time after an indication that the contacted device is unavailable until a subsequent availability indication.

21.   A method for an invoking device to adaptively estimate contacted device availability in a pervasive peer-to-peer environment, comprising:

observing a number of attempts by the invoking device to contact the contacted device and recording availability of the contacted device for each attempt as an

5   availability indication for a time associated with the attempt;

establishing a number of time bins, each time bin representing a range of time quantities between attempts by the invoking device to contact the contacted device;

setting a number of availability indications into each time bin based on separation in time between attempts and whether the contacted device was available or unavailable,

10   wherein said setting comprises balancing the number of time bins with the number of availability indications in each bin; and

establishing contacted device availability by correlating time since a last availability was received with an appropriate time bin and a ratio between available and unavailable indications within the appropriate time bin.

15   22.   The method of claim 21, wherein setting the number of availability indications comprises:

establishing a quantity of positive indications corresponding to an availability indication for the time bin being available, and

establishing a quantity of negative indications corresponding to an availability

20   indication for the time bin being unavailable.

23.   The method of claim 21, wherein establishing the number of time bins comprises establishing two sets of time bins, one set of time bins corresponding to an initial available indication, and the other set of time bins corresponding to an initial unavailable indication.

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24. The method of claim 21, wherein said establishing contacted device availability comprises computing a probability curve based on time bins and ratios associated with each time bin.

25. The method of claim 24, wherein said probability curve is smoothed using
5   linear interpolation.

26. The method of claim 24, wherein said probability curve is smoothed using polynomial interpolation.

27. The method of claim 21, wherein time bins have varying time spacing.

28. The method of claim 21, wherein balancing is achieved by setting both the
10 number of time bins with the number of availability indications in each bin equal to predetermined values multiplied by a square root of a number of neighboring sample pairs.

29. The method of claim 28, wherein the number of time bins is set equal to a constant multiplied by the square root of the number of neighboring sample pairs, and the
15 number of availability indications in each bin is set equal to an inverse of the constant multiplied by the square root of the number of neighboring sample pairs.